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मानक

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“Step Out From the Old to the New”

IS 14440 (1997): Drawing Instruments - Tubular tips for hand held technical pens using India ink on tracing paper [PGD 22: Educational Instruments and Equipment]



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भारतीय मानक

आरेखण उपकरण — अनुरेखण कागज पर
इंडिया स्याही का उपयोग करते हुए हाथ से लिखने
वाली तकनीकी पैनों के लिए नलिकाकार नोकें — विशिष्टि

Indian Standard

DRAWING INSTRUMENTS — TUBULAR TIPS FOR
HAND HELD TECHNICAL PENS USING INDIA INK
ON TRACING PAPER — SPECIFICATION

ICS 01.100.40

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Optical and Mathematical Instruments Sectional Committee had been approved by the Light Mechanical Engineering Division Council.

Tubular tips for hand-held technical pens are commonly used for draughting operations such as tracing, writing and lettering. The standard is fully aligned with ISO 9175-1 : 1988 'Tubular tips for hand-held technical pens using India ink on tracing paper Part 1 Definitions, dimensions, designation and marking' and ISO 9175-2 : 1988 'Tubular tips for hand-held technical pens using India ink on tracing paper Part 2 Performance, test parameters and test conditions'.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

DRAWING INSTRUMENTS — TUBULAR TIPS FOR HAND HELD TECHNICAL PENS USING INDIA INK ON TRACING PAPER — SPECIFICATION

1 SCOPE

This standard covers the dimensions and performance requirements for tubular tips for hand held technical pens using India ink on tracing paper. The standard also covers the requirements of the India ink lines drawn using tubular tips, test parameters and test conditions to verify compliance with these requirements.

2 REFERENCES

The following Indian Standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards given below:

<i>IS No.</i>	<i>Title</i>
196 : 1966	Atmospheric conditions for testing (revised)
8431 : 1986	Tracing paper (<i>first revision</i>)
10714 : 1983	General principles of presentation on technical drawings

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 India Ink

A water-based drawing fluid that contains dispersed carbon black as its primary colourant.

3.2 Tubular Tip

Component of a tubular technical pen for delivery of India ink from a supply tank to the tracing paper and having as its distinguishing characteristics:

- a) stepped tube of specified length and diameter (see Fig.1), and
- b) freely movable wire within the tube for controlling the ink flow.

3.3 Tubular Technical Pen

Hand-held instrument utilizing India ink and having as its distinguishing characteristics:

- a) a tubular tip,
- b) a reservoir or cartridge, and
- c) an ink feed system.

3.4 Reservoir

A fixed component consisting of a rigid or semi-rigid structure to be filled with India ink. A reservoir is intended to be refilled from a bulk supply.

3.5 Cartridge

Disposable container for the India ink supply, to be detached when empty and replaced by a new full container.

3.6 Ink Feed System

Means of providing, under predetermined ambient conditions:

- a) a mark of constant line thickness, at predetermined line generation rates varying within given limits, and
- b) protection against leakage of India ink.

4 DESIGN AND DIMENSIONS

4.1 A typical design of tubular tip and associated features is given in Fig. 1. Tubular tips, however, need not be identical to that shown in Fig. 1.

4.2 The dimensions of tubular tip shall be as given in Fig. 1 and Table 1.

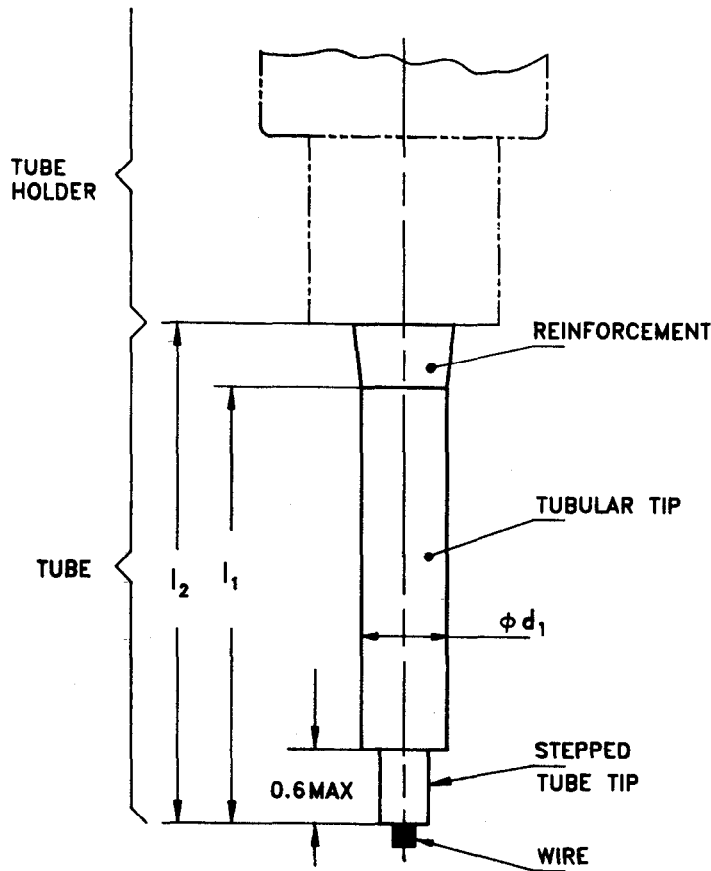


FIG. 1 TUBULAR TIP AND ASSOCIATED FEATURES

Table 1 Dimensions of Tubular Tips
(Clause 4.2)

All dimensions in millimetres.

Line Thickness ¹⁾	ϕd_1	Permissible Tolerance on ϕd_1	l_1 Min	$l_2^{2)}$ Min	Colour Code
0.13	0.35	0 -0.03	3	4	Violet
0.18	0.35				Red
0.25	0.35				White
0.35	0.5		Yellow		
0.5	0.7		Brown		
0.7	1		Blue		
1	1.4	0 -0.06	3.5		Orange
1.4	2				Green
2	2.8				Grey

¹⁾ According to IS 10714 except line thickness of 0.13 mm.

²⁾ Tubular tips for line thicknesses of 0.13, 0.18 and 0.25 mm may require reinforcement of the tube between l_1 and l_2 .

5 PERFORMANCE

5.1 To ensure consistency and accuracy in the preparation and reproduction of technical drawings, various line thicknesses and fixed relations between these line thicknesses are necessary.

5.2 The permissible deviations in the line thickness shall be within the values given in Table 2.

Table 2 Permissible Deviations in Line Thickness

Line Thickness, d mm	Permissible Deviation mm
0.13	+ 0.03 - 0.01
0.18	+ 0.03 - 0.01
0.25	+ 0.03 - 0.01
0.35	+ 0.04 - 0.04
0.5	+ 0.05 - 0.05
0.7	+ 0.07 - 0.07
1	+ 0.1 - 0.1
1.4	+ 0.2 - 0.2
2	+ 0.2 - 0.2

6 PERFORMANCE TEST

6.1 Basic Test Concept

Test lines of India ink shall be drawn on natural tracing paper in accordance with 6.4 and the line thicknesses shall be measured.

6.2 Climatic Conditions for Testing

The tests shall be carried out under standard test atmosphere of $23 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ RH (see IS 196).

6.3 Test Equipment and Accessories

6.3.1 Test Machine

The schematic representation of the test machine is given in Fig. 2. The test machine shall be an electromechanical line-draughting device with an adjustable writing angle, writing load, speed and line pitch.

6.3.2 Test Paper

6.3.2.1 The test paper shall be natural tracing paper (see IS 8431).

6.3.2.2 It shall be left to stabilize under test atmosphere as given in 6.2 for a minimum period of 24 h before the test is performed.

6.3.2.3 The test strip shall be cut parallel to the longest edge of the test paper.

6.3.3 Test Fluid

6.3.3.1 The test lines shall be drawn using India ink.

6.3.3.2 The India ink shall be supplied to the tubular tip by means of a freshly refilled reservoir or a new ink cartridge.

6.4 Test Lines

6.4.1 The tubular technical pen, of which the tubular

tip is under test, shall be prepared according to the manufacturer's specification for clearing and filling.

6.4.2 The tubular technical pen shall be fitted in the test machine. Ten lines of approximately 5 m in total length shall be drawn in accordance with test conditions given in 6.4.2.1 to 6.4.2.5.

6.4.2.1 The load on the tubular tip shall be 0.1 N for $d = 0.13$ mm and 0.2 N for $d \geq 0.18$ mm.

6.4.2.2 The writing angle of the tubular technical pen shall be 87° to the horizontal plane of the oncoming test paper, as shown in Fig. 2.

6.4.2.3 The draughting speed shall be:

- 5 ± 0.3 cm/s for $d = 0.13$ to 0.7 mm;
- 3 ± 0.2 cm/s for $d = 1$ and 1.4 mm; and
- 2 ± 0.2 cm/s for $d = 2$ mm.

6.4.2.4 The conveyer belt shall consist of a polyester film, 0.1 mm thick, moving on a solid smooth metal plate.

6.4.2.5 The step-transverse movement (pitch) of the test machine shall be 3 mm/cycle.

6.5 Measurement of Line Thickness

6.5.1 The line thickness shall be determined:

- microscopically, using a micrometer scale in the ocular, or
- by using magnified projection on a projector microscope.

6.5.2 The measuring device shall have a minimum accuracy of 0.01 mm.

6.5.3 The line thickness measurements shall be taken at 10 intersections of an imaginary line, drawn

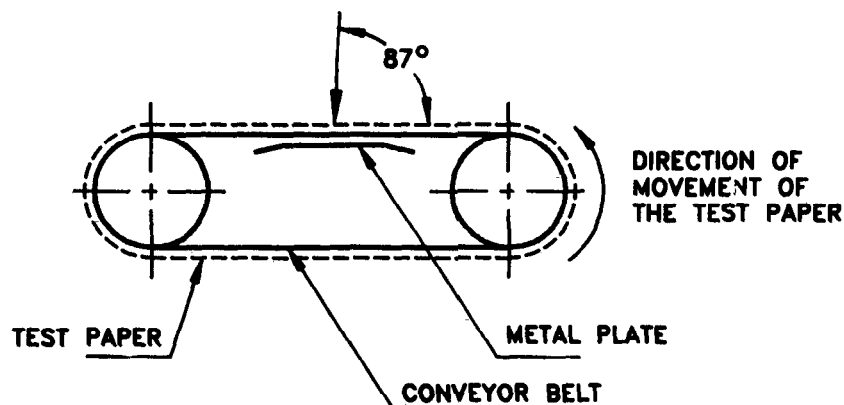


FIG. 2 SCHEMATIC REPRESENTATION OF THE TEST MACHINE

perpendicular to the test lines, with the 10 test lines.

6.5.4 A further set of measurements shall be made at a distance of approximately 150 mm from the first imaginary line. The irregularities at the edges of the test lines are interpolated visually (see Fig. 3) and the measurement is taken as the distance between these interpolated averages.

6.5.5 The test result is the arithmetic average of 20 measurements, rounded off to the nearest 0.01 mm.

7 TEST REPORT

The report shall contain the following information:

- reference to this Indian standard;
- type and designation of the tubular technical pen under test;
- test result (line thickness), in mm, as specified in 6.5.5;
- details of any deviations in test parameters or conditions from those specified in this Indian Standard; and
- technical data, name of the test centre, date and signature of the inspector.

8 DESIGNATION

The designation of tubular tips shall consist of:

- the block descriptor 'Tubular tip';

b) reference to this standard; and

c) the line thickness, in mm.

Example:

Designation of a tubular tip for a line thickness of 0.7 mm:

Tubular tip IS 14440 0.7

9 MARKING

9.1 Tubular tips for technical pens conforming to this standard shall be marked on a component firmly secured to the tubular tip with the line thickness in accordance with 8 or the colour code or preferably both (see Table 1).

9.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

9.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

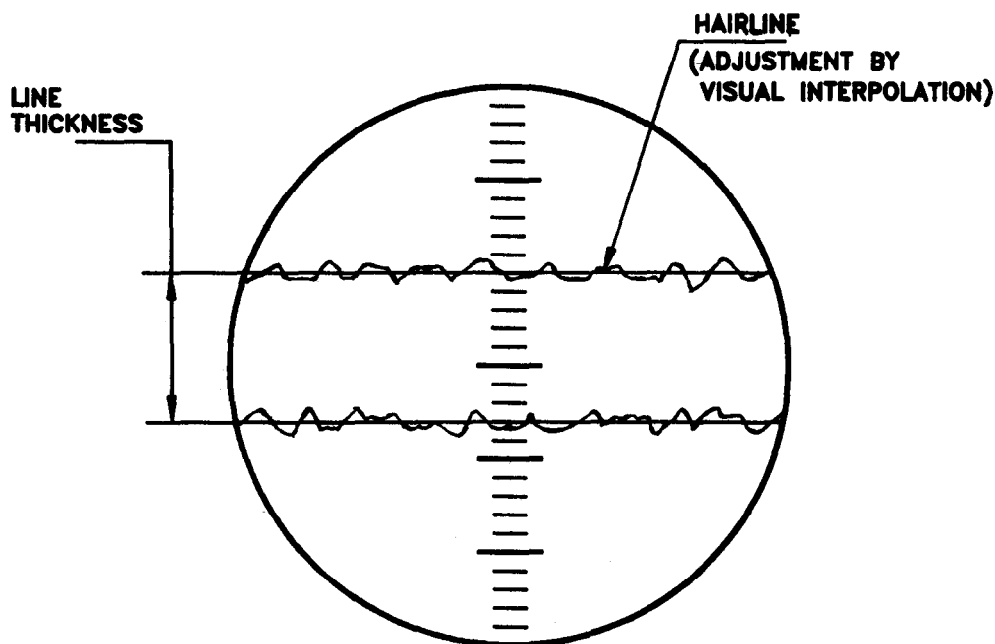


FIG. 3 EVALUATION OF THE LINE THICKNESS

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Amendments Issued Since Publication

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